What is claimed is:

1. An integrated processing comprising:

a central transfer chamber;

an etch chamber coupled to the transfer chamber;

a post-etch treatment chamber coupled to the transfer chamber for thinning polymers deposited on sidewalls of a feature formed during an etch process performed in the etch chamber;

at least one load lock chamber coupled to the transfer chamber;

a first robot disposed in the transfer chamber and adapted to transfer substrates between the load lock chamber, the post-etch treatment chamber and the etch chamber;

a factory interface coupled the load lock chamber;

an optical metrology tool disposed in the factory interface; and

a second robot disposed in the factory interface and adapted to transfer substrates between the load lock chamber and the optical measuring tool.

2. The system of claim 1, wherein the post-etch treatment chamber further comprises:

a remote plasma source coupled to the post-etch treatment chamber;

a gas source providing a gas mixture of nitrogen (N_2), hydrogen (H_2) and oxygen (O_2) to the remote plasma source, wherein a N_2:H_2 flow ratio is about 3:1 to 100 percent (N_2);

a power source inductively coupled to the remote plasma source providing between about 1000 to 7000 W at about 200 to 600 kHz to form a plasma from the gas mixture; and

a substrate support disposed in the post-etch treatment chamber for supporting and maintaining a wafer temperature between 200 and 350 degrees Celsius.

3. A method of etching a feature on a substrate in a single processing tool having an etch chamber, a post-treatment chamber and an optical measuring device suitable for obtaining a metric of a critical dimension (CD) of the etch feature, the method comprising:

obtaining pre-etch CD critical dimension information of the feature formed on the substrate;

etching the substrate; wherein said etch process deposits a polymer on the sidewall of the feature;

post-etch treating the substrate to reduce a thickness of a polymer disposed on the feature during etching; and

obtaining post-etch CD information of the feature.

4. The method of claim 3, wherein the step of post-etch processing further comprises:

exposing the substrate to a remotely generated plasma formed from a gas mixture of nitrogen (N_2), hydrogen (H_2) and oxygen (O_2).

5. The method of claim 4, wherein the gas mixture further comprises:

a N_2:H_2 flow ratio is about 3:1 to 100 percent (N_2).

6. The method of claim 3, wherein the step of post-etch processing further comprises:

maintaining a substrate temperature between 200 and 350 degrees Celsius.

7. The method of claim 3, wherein the step of post-etch processing further comprises:

providing N_2 and H_2 at a N_2:H_2 flow ratio of about 24:1, and O_2 to a remote plasma source;

inductively coupling about 5000 W of power to the remote plasma source to form a plasma;

exposing the substrate to the plasma;

maintaining the substrate at temperature of about 250 degrees Celsius; and

maintaining a post-etch treatment chamber pressure of about 750 mTorr.

8. A method for controlling accuracy and repeatability of an etch process, comprising:

(a) providing a batch of substrates, each substrate having a patterned mask formed on a film stack comprising at least one material layer;

(b) measuring dimensions of elements of the patterned mask on at least one substrate of the batch of substrates;

(c) trimming the patterned mask on the at least one substrate using a process recipe based on the measurements performed at step (b);

(d) etching the at least one material layer on the at least one substrate;

(e) measuring dimensions of etched structures formed on the at least one substrate during step (d); and

(f) adjusting the process recipe of step (c) or/and the process recipe of step (d) based on the measurements performed at step (e).

9. The method of claim 8 wherein the steps (b) and (e) use an optical measuring technique.

10. The method of claim 9 wherein the optical measuring technique is a scatterometric measuring technique.

11. The method of claim 8 wherein the steps (b) through (e) are performed using processing modules of a single substrate processing system.

12. The method of claim 8 wherein the step (f) further comprises:

modifying a time duration or process parameters for trimming the patterned mask.

13. The method of claim 8 wherein the step (f) further comprises:

modifying a time duration or process parameters for etching the material layer.

14. The method of claim 8 wherein the step (d) further comprises:

compacting/outgassing or removing at least a portion of post-etch residue formed on sidewalls of the etched structures.

15. The method of claim 7 further comprising:

thinning the post-etch residue to a thickness of less than about 10 nm.

16. A method for controlling accuracy and repeatability during formation of a gate structure of a field effect transistor, comprising:

(a) providing a batch of substrates, each substrate having a patterned mask formed on a gate electrode layer of the gate structure;

(b) measuring dimensions of elements of the patterned mask on at least one substrate of the batch of substrates;

(c) trimming the patterned mask on the at least one substrate using a process recipe based on the measurements performed at step (b);

(d) etching the gate electrode layer on the at least one substrate;

(e) measuring dimensions of etched gate electrode structures formed on the at least one substrate during step (d); and

(f) adjusting the process recipe of step (c) or/and the process recipe of step (d) based on the measurements performed at step (e).

17. The method of claim 15 wherein the steps (b) and (e) use an optical measuring technique.

18. The method of claim 16 wherein the optical measuring technique is a scatterometric measuring technique.

19. The method of claim 15 wherein the steps (b) through (e) are performed using processing modules of a single substrate processing system.

20. The method of claim 15 wherein the step (f) further comprises:

modifying a time duration or process parameters for trimming the patterned mask.

21. The method of claim 15 wherein the step (f) further comprises:

modifying a time duration or process parameters for etching the material layer.

22. The method of claim 15 wherein the gate electrode layer comprises doped polysilicon.

23. The method of claim 21 wherein the step (d) further comprises:

providing HBr and Cl_2 at a flow ratio HBr:Cl_2 in a range from 1:15 to 15:1.

24. The method of claim 15 wherein the step (d) further comprises:

compacting/outgassing or removing at least a portion of post-etch residue formed on sidewalls of the etched gate electrode structures.

25. The method of claim 23 further comprising:

thinning the post-etch residue to a thickness of less than about 10 nm.

26. The method of claim 23 further comprising:

using a plasma comprising one or more gases selected from the group consisting of nitrogen (N_2), oxygen (O_2) and hydrogen (H_2).

27. The method of claim 24 further comprising:

providing nitrogen (N_2) and hydrogen (H_2) at a N_2:H_2 flow ratio in a range from 3:1 to 100% of N_2;

maintaining the substrate at a temperature between about 200 and 350 degrees Celsius;

applying power to an inductively coupled power source between about 1000 and 7000 W; and

maintaining a chamber pressure between about 500 and 2000 mTorr.

28. A processing system for controlling accuracy and repeatability of an etch process, comprising:

a plenum having a robot therein;

a process chamber coupled to the plenum;

a post-etch treatment chamber coupled to the plenum for thinning sidewall residues generated during etching;

a metrology tool coupled to the plenum; and

a controller; wherein the controller adjusts an etch process for etching a material layer on at least one substrate of a batch of substrates as a function of pre-etch measurements of dimensions of a patterned mask and post-etch measurements of post-etched treated structures performed by the metrology tool.

29. The system of claim 27 wherein the metrology tool performs an optical measuring technique.

30. The system of claim 27 wherein the optical measuring technique is an optical scatterometric measuring technique.